

Improved Academic Achievement by Students in the Christina School District who used Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the academic achievement of students who used the products within the curriculum in a school setting. **Study Design:** The design of this study was a multiple school case study using nationally normed tests, state assessments, and district benchmarks. **Participants:** Study participants were elementary and intermediate school students who were attending nineteen schools in the Christina School District in Wilmington, Delaware. **Materials & Implementation:** Following staff training on the Fast ForWord products, a group of students used the products during the 2004 – 2005 school year. Before and after Fast ForWord participation, student reading and academic performance was evaluated with the STAR Reading, Reading Benchmark, Standards Master, Gates MacGinitie Reading Tests (GMRT) and/or the Delaware Student Testing Program (DSTP) assessments. **Results:** On average, students achieved significant gains in their reading skills after Fast ForWord participation. Improvements in reading achievement were reflected in the 11 months of improvement on the STAR assessment over an eight month period. On Delaware’s high-stakes test, on average, students in the study improved from the 36th percentile to the 47th percentile. Fifty-six percent of the students improved one or more levels on at least one of the subtests of the DSTP with an average improvement on the Reading subtest of more one-fourth of a standard deviation.

Keywords: Delaware, elementary schools, intermediate schools, suburban district, observational study, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, Fast ForWord to Reading 4, STAR Reading, Reading Benchmark, Standards Master, Gates-MacGinitie Reading Tests (GMRT), Delaware Student Testing Program (DSTP).

INTRODUCTION

Numerous research studies have shown that cognitive and oral language skills are under-developed in struggling readers, limiting their academic progress (Lyon, 1996). University-based research studies reported the development of a computer software product that focused on learning and cognitive skills, and provided an optimal learning environment for building the memory, attention, processing and sequencing skills critical for reading success (Merzenich et al., 1996; Tallal et al., 1996). This prototype of the Fast ForWord Language software showed that an optimal learning environment and focus on early reading and cognitive skills resulted in dramatic improvements in the auditory processing and language skills of school children who had specific language impairments (Merzenich et al, 1996; Tallal et al., 1996) or were experiencing academic reading failure (Miller et al., 1999). The Christina School District was interested in evaluating the effectiveness of an optimal learning environment with a focus on early reading and cognitive skills as a way for improving academic achievement of students in a school setting. In this study, commercially available computer-based products (Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord

Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, and Fast ForWord to Reading 4) were used to evaluate the effectiveness of this approach at improving the academic achievement of students.

METHODS

Participants

The city of Wilmington, Delaware, is located 50 miles north of the state capital, Dover, and 30 miles southwest of Philadelphia, Pennsylvania. The Christina School District is a pre-Kindergarten through twelfth grade school district with 28 schools serving over 19,000 students. Forty-seven percent of the student population is Caucasian and 38% is African-American. Thirty-six percent of students are classified as low-income. Nearly 3,000 students have Individualized Education Plans and 3% of students are considered limited English proficient. Approximately 17% receive special education services.

During the 2004 – 2005 school year, students from nineteen schools in the Christina School District used the Fast ForWord products and took part in the study reported here. Students had their reading and academic skills evaluated with the STAR Reading,

Reading Benchmarks, Standards Master, Gates MacGinitie Reading Tests (GMRT) or the Delaware Student Testing Program (DSTP) assessments before and after Fast ForWord participation. Nine hundred and eight students had scores from before and after Fast ForWord participation available for analysis. School personnel administered the assessments and reported scores for analysis.

Study participants were in first through tenth grade with an average grade level of 4.0. A few schools included demographic information when reporting student data. Approximately 10% of the study participants were reported as having Individualized Education Plans (IEPs), 6% had Individual Improvement Plans (IIPs), 8% had Individual Reading Plans (IRPs), and 2% were participating in Help One Student to Succeed (HOSTS), an individual academic mentoring program.

Implementation

Educators were trained in current and established neuroscience findings on how phonemic awareness and the acoustic properties of speech impact rapid development of language and reading skills; the scientific background validating the efficacy of the products; methods for assessment of potential candidates for participation; the selection of appropriate measures for testing and evaluation; effective implementation techniques; approaches for using Progress Tracker reports to monitor student performance; and techniques for measuring the gains students have achieved after they have finished using Fast ForWord products.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. The products used by the Christina School District, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, and Fast ForWord to Reading 4 include five to seven exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension. While there are variations across products related to the specific skills targeted and the approaches taken, there are several critical skills developed in all of the products, as detailed in the following exercise descriptions.

*Circus Sequence*¹, *Sweeps*², and *Trog Walkers*³: Students hear a series of short, non-verbal tones. Each tone represents a different fragment of the frequency spectrum used in spoken language. Students are asked to differentiate between these tones. The exercises improve working memory, sound processing speed, and sequencing skills.

*Old MacDonald's Flying Farm*¹ and *Streams*²: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

*Phoneme Identification*¹, *IDs*², *Polar Cop*³, and *Treasure in the Tomb*³: Students hear a target phoneme, and then must identify the identical phoneme when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific phoneme. *Polar Cop* also develops sound-letter correspondence skills. *Treasure in the Tomb* also develops grapheme recognition.

*Phonic Match*¹, *Matches*², and *Bug Out*³: Students choose a square on a grid and hear a sound or word. Each sound or word has a match somewhere within the grid. The goal is to find each square's match and clear the grid. The *Phonic Match* exercise develops auditory word recognition and phoneme discrimination, improves working memory, and increases sound processing speed. The *Bug Out!* exercise develops skill with sound-letter correspondences as well as working memory.

*Phonic Words*¹ and *Cards*²: Students see two pictures representing words that differ only by the initial or final consonant (e.g., "face" versus "vase", or "tack" versus "tag"). When students hear one of the words, they must click the picture that matches the word. This exercise increases sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

*Language Comprehension Builder*¹: Students listen to a sentence that depicts action and complex relational themes. Students must match a picture representation with the sentence they just heard. This exercise

¹ Exercise from the Fast ForWord Language product.

² Exercise from the Fast ForWord Middle & High School product.

³ Exercise from the Fast ForWord Language to Reading product.

develops oral language and listening comprehension, improves understanding of syntax and morphology, and improves rate of auditory processing.

*Block Commander*¹: In *Block Commander*, a three-dimensional board is filled with familiar shapes that students select and manipulate. The students are asked to follow increasingly complex commands. This exercise increases listening comprehension, improves syntax, develops working memory, improves sound processing speed, and increases the ability to follow directions.

*Stories*² and *Start-Up Stories*³: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

*Bear Bags*⁴ and *Bear Bags: More Lunch*⁵: In these exercises, the participant is asked to help Mama Bear sort words (on pieces of toast) into phoneme-based categories (in lunch bags). They develop phonemic awareness and decoding of single-syllable words. *Bear Bags* also develops understanding of alphabetic principles (phonics) and *Bear Bags: More Lunch* also develops grapheme/phoneme associations.

*Magic Rabbit*⁴ and *Magic Bird*⁵: These exercises combine spelling and word-building practice with spelling patterns and word families commonly studied in 1st grade for *Magic Rabbit* and in 2nd grade for *Magic Bird*. The task is designed to emphasize the relationships between words by showing how one word can be turned into another by simply changing a single letter in any position. Using a click and drag interface, the participant must either select the missing letter to complete a partially spelled word or rearrange scrambled letter tiles to spell a word. These exercises develop spelling and sensitivity to letter-sound correspondences.

*Flying Fish*⁴ and *Fish Frenzy*⁵: In these exercises, a fishing pelican pronounces a word. Then a series of spoken and/or written words (on fish) fly across the pond and the participant clicks on the word when it matches the pronounced word. These exercises develop decoding skills, identification of sight words, and auditory memory.

*Quail Mail*⁴: In *Quail Mail*, a squirrel mail carrier pulls words out of a mailbag and the participant sorts them into different categories by clicking on the appropriate mailbox. This exercise encourages

flexibility during reading and automatic access to the various dimensions of vocabulary.

*Bedtime Beasties*⁴ and *Leaping Lizards*⁵: These exercises use the “cloze task,” in which a written and aurally presented sentence has a word missing. The participant must select the correct word to complete the sentence from four choices. Vocabulary skills and sentence comprehension are developed in these exercises.

*Buzz Fly*⁴ and *Dog Bone*⁵: In these exercises, the participant listens to a passage and answers comprehension questions relating to each passage. The questions are aurally presented and written, and the response choices are presented as pictures. Responses are presented as words or short phrases in *Dog Bone*. These exercises develop listening comprehension and working memory skills as measured by performance on multiple choice questions.

*Ant Antics*⁵: The participant will be presented with a picture and then asked to pick one of the four alternatives that best describes an aspect of that picture. This exercise improves vocabulary skills and sentence comprehension.

*Scrap Cat*⁶: In *Scrap Cat*, a series of words is visually presented and participants are asked to sort each word into the correct semantic, phonological, syntactic, or morphological category. For this exercise only, the participant can click a button to hear any word and see it defined. This exercise develops decoding, vocabulary, and word recognition skills.

*Canine Crew*⁶: In *Canine Crew* multiple words are presented together in a grid and participants are asked to find pairs that match on the basis of the current criterion. This criterion shifts from words that rhyme, to synonyms, to antonyms, to homophones, as the participant progresses. This exercise develops vocabulary, decoding, and automatic word recognition.

*Chicken Dog*⁶: Participants hear a word and see it partially spelled. They must complete the word by filling in the missing letter or letter group. Five options are always provided, including options that represent common visual and phonological errors. This exercise develops basic spelling patterns, letter-sound correspondences, and decoding.

*Twisted Pictures*⁶: Participants are presented with a variety of pictures and asked to select the sentence that

⁴ Exercise from the Fast ForWord to Reading 1 product.

⁵ Exercise from the Fast ForWord to Reading 2 product.

⁶ Exercise from the Fast ForWord to Reading 3 product.

most accurately describes each picture from among four alternatives. The descriptive sentences incorporate a wide range of syntactic structures. As the participant progresses, the sentences get longer and more difficult vocabulary is included. This exercise builds sentence comprehension by developing syntax, working memory, logical reasoning, and vocabulary.

*Book Monkeys*⁶: Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice questions demand that the participant use memory for literal detail, generation of inferences, or grasp of among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

*Hog Hat Zone*⁶: In Hog Hat Zone, short passages from classic children's literature are presented, with occasional gaps in the text where words are missing. Participants are asked to fill in each gap with the correct word from among four alternatives. The missing words are morphologically important items such as pronouns, auxiliary verbs, and words with suffixes and prefixes. This task develops paragraph comprehension, complex morphology, flexible reading, and vocabulary.

*Hoof Beat*⁷: The participant is presented with a question and four possible answers. The participant must choose the most appropriate answer. The questions relate to semantics, phonology, morphology, orthography, and syntax. The exercise encourages flexibility during reading and automatic access to the various dimensions of vocabulary and is designed to build vocabulary by showing the participant how words function.

*Jitterbug Jukebox*⁷: The participant hears a word spoken aloud and letters appear on the keys of a jukebox. The participant must spell the word by clicking on the jukebox keys. Jitterbug Jukebox helps participants improve spelling and sensitivity to letter-sound correspondences. This exercise includes many of the 500 most commonly used words in written English including most word families found in 3rd and 4th grade content standards.

*Goat Quotes*⁷: In Goat Quotes four newspapers paraphrase a headline at the top of a news kiosk. The participant must select the correct paraphrase. The exercise is designed to sample the basic syntactic (i.e., grammatical) structures of spoken English generally

mastered in the early elementary grades. The exercise develops logical thinking and working memory skills as well careful reading.

*Book Monkeys: Book Two*⁷: Participant reads a passage, chart, or schedule and then answers questions related to the material. This exercise develops a participants' ability to read for literal meaning, cause-and-effect relationships, and inferential comprehension. It also develops a participant's working memory as well as vocabulary skills, which are crucial for flexible, fluent reading.

*Stinky Bill's Billboard*⁷: Participants must select the word that accurately completes a sentence. In this exercise, participants improve sentence comprehension while practicing the decoding of words in realistic contexts. This exercise also helps build vocabulary and awareness of word structure.

*Lulu's Laundry Line*⁷: Short passages are presented with occasional gaps where punctuation is missing. The participant must read the words and understand the passage in order to determine the correct punctuation. The exercise develops punctuation skills as well as automaticity for decoding and sentence comprehension.

Assessments

Most of the students started using Fast ForWord products in the first half of the 2004 – 2005 school year (October – January), finishing the first product before April and then continuing on to additional products.

Before they used the products, students were evaluated with at one or more of the following assessments: STAR Reading, Reading Benchmark, Standards Master, Gates MacGinitie Reading Tests (GMRT) or the Delaware Student Testing Program (DSTP). Students were re-evaluated after they finished one or more products—a few were re-evaluated towards the end of the first product. For the STAR Reading, pre-participation testing was in September of 2004 or in January of 2005. Post-Fast ForWord testing was in April or May 2005, after approximately half of the students had completed the Fast ForWord Language product.

On average, Standards Master testing was in October 2004, February 2005 and May 2005. Most students had pre-Fast ForWord Standards Master testing in October; a few pre-tested in February. At the time of post-testing in May of 2005, most students had finished the Fast ForWord Language product.

⁷ Exercise from the Fast ForWord to Reading 4 product.

DSTP tests are administered annually in March; most students with DSTP scores had completed the Fast ForWord Language product by March of 2005.

No test dates were available for the Reading Benchmark or the GMRT; test dates were missing for approximately one-sixth of the STAR Reading scores.

STAR Reading: The STAR Reading assessment is a criterion- and norm-referenced test of reading ability. It consists of computer adaptive multiple choice questions and is appropriate for grades 1 through 12.

Reading Benchmark: Benchmark books are Reading Recovery leveled books used district-wide by the Christina School District to assess student reading fluency and comprehension. Reading Benchmarks are used in grades 1-3 and highly recommended for use in grade 4. Students read a benchmark book from a District chosen list and are instructed to retell as much about the book as they can after they have finished reading.

Standards Master: The Standards Master measures student progress on Delaware state standards in Reading and Math. It is administered four times per year, before and after the Delaware Student Testing Program (DSTP) assessment.

Gates-MacGinitie Reading Tests (GMRT): The GMRT is used to assess a child's decoding, vocabulary, and passage comprehension skills. The test has two components, independently assessing reading vocabulary and comprehension. Scores can be reported for the individual subtests and/or the overall assessment.

Delaware Student Testing Program (DSTP): The DSTP is an annual state assessment that tests a student's knowledge of the content in Delaware state standards. Tests of language arts (reading and writing) and mathematics are administered in the Spring to 2nd – 10th graders.

Students answer multiple choice, short answer and extended response questions in the reading and math assessments. Scores can be reported in a variety of ways including normal curve equivalents and performance levels. Performance levels for language arts and mathematics range from one to five, where one is "well below the standard performance" and five is "distinguished performance". A score of three indicates a student has met the standard performance for proficiency.

Analysis

Scores were reported in terms of grade equivalents for the STAR Reading assessment, in levels for the

Reading Benchmark assessment, in percentiles for the Standards Master, in normal curve equivalents (NCEs) and grade equivalents for the Gates-MacGinitie Reading Tests (GMRT), and in raw scores, scale scores, percentiles, NCEs and performance levels for the Delaware Student Testing Program (DSTP). Where available, NCEs were used in the analyses. Data were analyzed using paired t-tests. All analyses used a p-value of less than 0.05 as the criterion for identifying statistical significance.

RESULTS

Participation Level

Research conducted by Scientific Learning shows a relationship between product use and the benefits of the product. Product use is composed of content completed, days of use, and adherence to the chosen protocol (participation level and attendance level). During the 2004 – 2005 school year, the Christina School District chose to use a combination of different protocols calling for students to use the products for 48, 50, 90 or 100 minutes a day, five days per week, for four to twelve weeks. Almost all students started with either the Fast ForWord Language product or the Fast ForWord Middle & High School product. Most then went on to use the Fast ForWord Language to Reading product. Detailed product use is shown in Table 1.

Figures 1 through 6 show the average daily progress through the Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, and Fast ForWord to Reading 3 product exercises for students who had scores available for analysis. The final day shown is determined by the maximum number of days that at least two-thirds of the students participated. For students who used the product fewer than the number of days shown, percent complete is maintained at the level achieved on their final day of product use.

	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language	858	31	68	72%	94%	66%
Fast ForWord Middle & High School	24	27	77	50%	55%	23%
Fast ForWord Language to Reading	622	30	69	63%	95%	64%
Fast ForWord to Reading 1	15	14	28	81%	86%	69%
Fast ForWord to Reading 2	22	20	37	73%	90%	74%
Fast ForWord to Reading 3	27	28	76	56%	84%	59%
Fast ForWord to Reading 4	4	na	na	na	na	na

Table 1. Usage data showing the number of students who used each Fast ForWord product along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of product completed, the participation level, and the attendance level. Due to the low number of students who used the Fast ForWord to Reading 4 product, product use information is not shown.

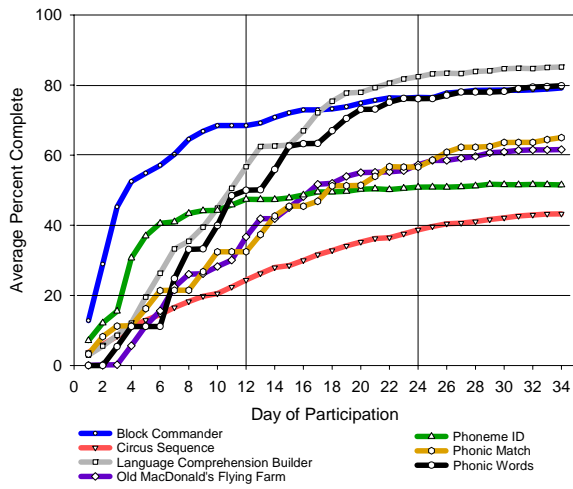


Figure 1. Average daily progress through the Fast ForWord Language product exercises. Results from 858 students are shown.

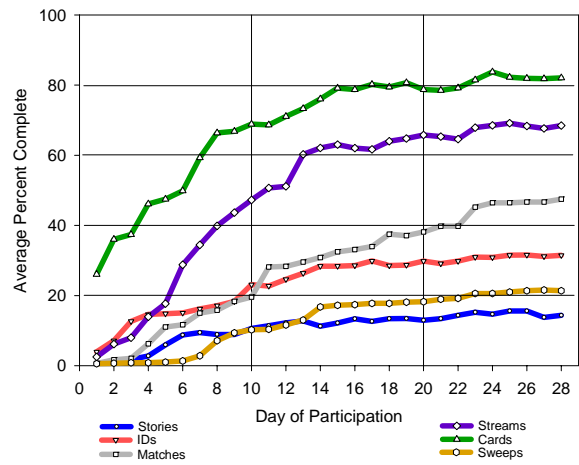


Figure 2. Average daily progress through the Fast ForWord Middle & High School product exercises. Results from 24 students are shown.

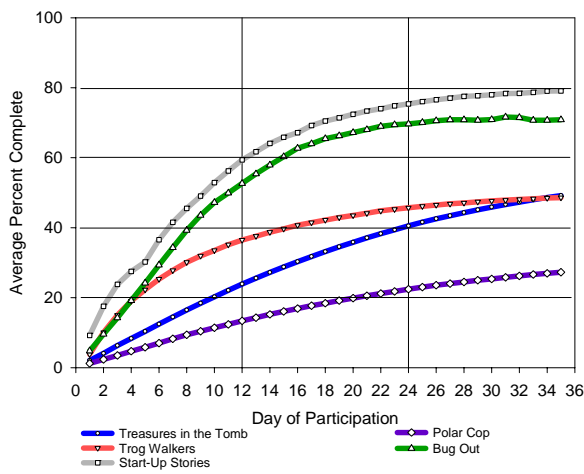


Figure 3. Average daily progress through the Fast ForWord Language to Reading product exercises. Results from 622 students are shown.

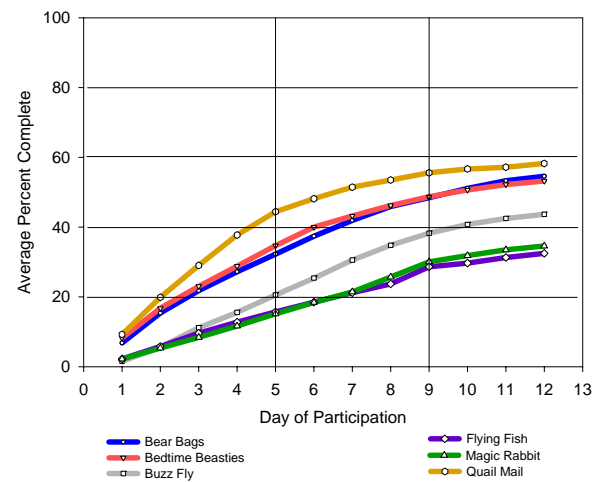


Figure 4. Average daily progress through the Fast ForWord to Reading 1 product exercises. Results from 15 students are shown.

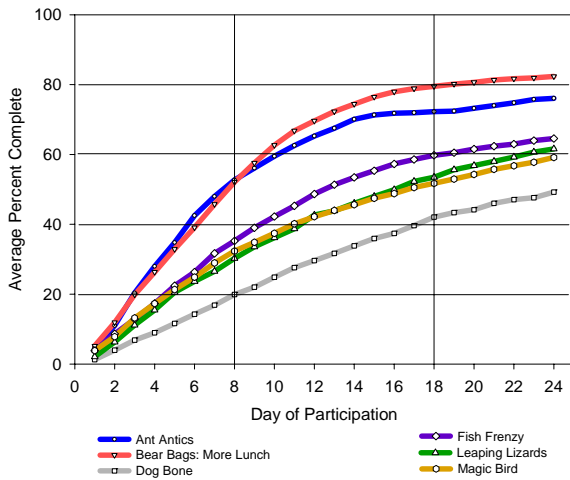


Figure 5. Average daily progress through the Fast ForWord to Reading 2 product exercises. Results from 22 students are shown.

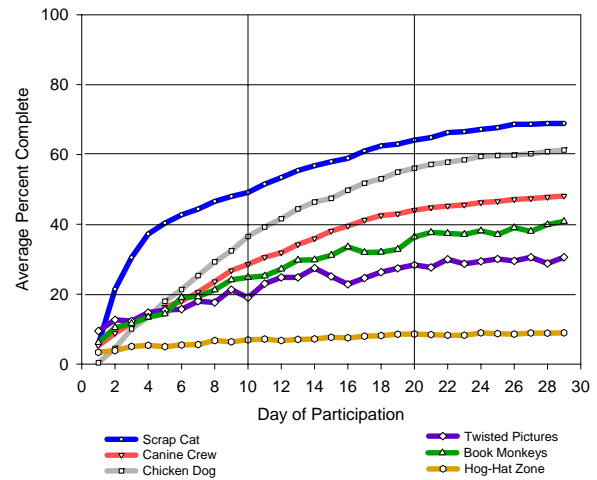


Figure 6. Average daily progress through the Fast ForWord to Reading 3 product exercises. Results from 27 students are shown.

Assessment Results

Assessments ranged from mandated state and district tests that align with the school curriculum and teaching goals to tests that are more independent of the curriculum used. The type of scores available varied by test and by school. When options were available, the score most appropriate for statistical analyses was used (Table 2).

Assessment	n	Type of score
DSTP	754	NCE
Standards Master	402	Level
Reading Benchmark	231	Percentage
GMRT	37	NCE
GMRT	102	Grade Equivalent
STAR Reading	306	Grade Equivalent

Table 2. The list of assessments used in this study along with the number and type of score used in the analyses.

Delaware Student Testing Program (DSTP): DSTP scores were reported in terms of raw scores, scale scores, percentiles, performance levels and normal curve equivalents (NCEs) for the Reading and Math assessments. NCEs, which allow for comparisons across grades, are the most appropriate units for statistical analyses; a student who learns at a rate such that his reading skills maintain a consistent ranking relative to peers will have a constant NCE. An increase or decrease indicates that the rate at which the student is acquiring skills, relative to his peers, has changed.

Seven hundred fifty-eight students had DSTP scores available from before and after product use on one or more of the subtests. The students with DSTP scores

available ranged from second to tenth grade although over 85% of the students with scores available were in 3rd, 4th, or 5th grade.

DSTP	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Reading	643	42.4	0.61	48.2	0.60	8.38*
Math	747	43.3	0.64	46.5	0.62	5.01*

Table 3. After Fast ForWord participation, students, on average, made significant gains in their academic achievement. * $p < 0.05$.

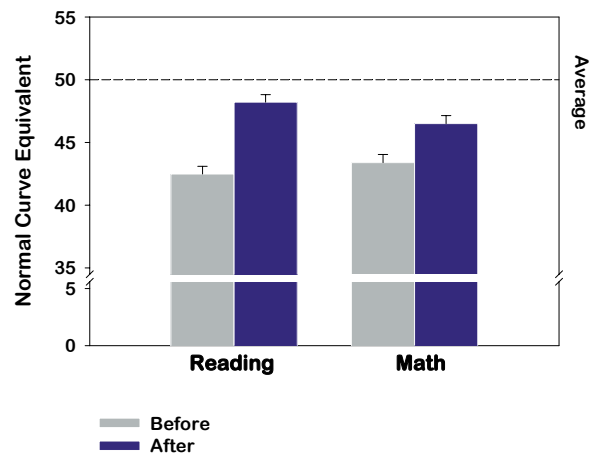


Figure 7. On average, students significantly improved their academic achievement after Fast ForWord participation.

The average NCE score of the 643 students who had DSTP Reading scores available for analysis was 42.4 before Fast ForWord participation corresponding to the 36th percentile. Students, on average, improved

significantly after Fast ForWord product use to a score of 48.2, corresponding to the 47th percentile and nearly meeting the national average. Students also, on average, made significant improvements in their mathematical abilities (Table 3; Figure 7).

DSTP performance levels for Reading, Math, and Writing range from one to five, where one is “well below the standard performance” and five is “distinguished performance”. A score of three indicates a student has met the standard performance

for proficiency. Table 4 shows the breakdown in percentages of the DSTP Reading, Math and Writing performance levels before and after students used the Fast ForWord products.

Seventy-seven percent of the students improved their NCE score in at least one area; enough to increase their performance level in Reading, Math, or Writing after Fast ForWord product use with 35%, 30% and 40% of the students improving at least one level in Reading, Math and Writing respectively.

Performance Level	Reading					Math					Writing				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Before FFWD	45.6	12.1	40.9	1.1	0.3	41.5	16.9	40.0	1.5	0.1	54.8	30.1	14.9	0.2	0
After FFWD	29.4	19.8	47.9	2.5	0.5	33.7	17.8	44.8	3.2	0.4	42.1	40.1	17.8	0	0

Table 4. The percentages of students at each performance level for the DSTP Reading, Math, and Writing assessments. A score of three indicates a student has met the Delaware standards for proficiency.

Standards Master: Scores on the Standards Master were reported as percentages for 402 students in 2nd through 6th grade. Before Fast ForWord participation, students, on average, scored 37%. After Fast ForWord use, students achieved significant improvements reaching scores of 51% (Figure 8; Table 5).

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Standards Master	402	37.1	0.89	51.3	1.11	14.5*
Reading Benchmark	231	18.0	0.32	20.2	0.37	6.41*

Table 5. On average, students made significant improvements in reading ability after using the Fast ForWord products. *p<0.05.

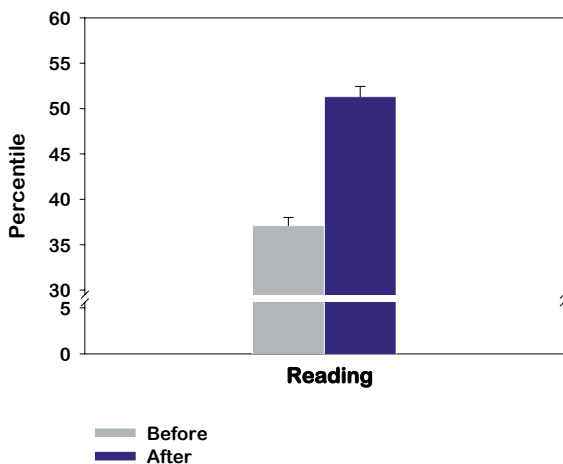


Figure 8. On average, students had significant gains in reading skills after Fast ForWord participation. Results from 402 students are shown.

Reading Benchmark: Two hundred and thirty-one students had Reading Benchmark scores available for analysis. Students had an average grade-level of 2.8. Reading Benchmark scores were reported in terms of levels which are one of the criteria considered when deciding student grade promotion. The cut-offs for Reading Benchmark levels are 12, 19 and 22 for first, second and third graders respectively. After Fast ForWord participation, students significantly improved to a score of 20.2, with 73% achieving their benchmark goal (Table 5; Figure 9).

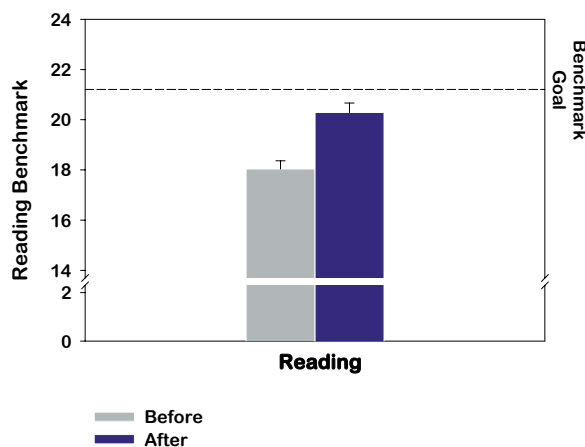


Figure 9. Students, on average, had significant improvements and moved closer to their benchmark goal after Fast ForWord participation. The benchmark goal shown is a weighted average using the three separate goals for first, second and third graders. Results from 231 students are shown.

Gates-MacGinitie Reading Tests (GMRT): Six schools in this study used the GMRT assessment to evaluate student reading ability. Five of the schools reported their GMRT scores in terms of grade equivalents; the sixth school reported in terms of normal curve equivalents (NCEs). On average, the students at the five schools with grade equivalent scores and the students at the school with NCE scores

achieved significant improvements in their reading skills. Students at the school with NCE scores improved nearly one-fifth of a standard deviation in reading skills, and students who had grade equivalent scores available improved their reading performance by ten months (Table 6; Figure 10).

GMRT	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
NCEs	37	23.4	2.07	27.5	1.98	2.27*
Grade Equivalents	102	2.92	0.10	3.81	0.11	12.1*

Table 6. Students from the six schools who had GMRT scores available improved, on average, significantly in reading ability after using Fast ForWord products. * $p < 0.05$.

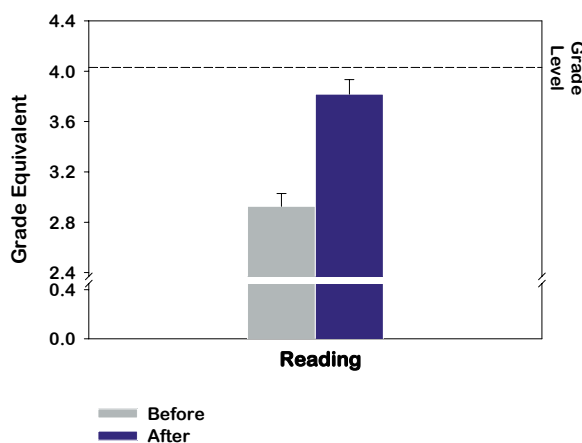


Figure 10. After Fast ForWord use, students, on average, improved 10 months in reading skills. Results from 102 students are shown.

STAR Reading: Scores on the STAR Reading were reported for 306 students in terms of grade equivalents. On average, before Fast ForWord participation, students were performing at a low second grade level and had an actual grade level of 3.2. After Fast ForWord use, the group of students made significant improvements, gaining ten months in reading grade level (Figure 11; Table 7). For the 251 students who had pre- and post-test dates available, the average time between test administrations was eight months, and the average improvement in reading grade level was eleven months.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
STAR Reading	306	2.14	0.06	3.01	0.07	17.0*

Table 7. On average, students gained ten months in reading grade level after using the Fast ForWord products. * $p < 0.05$. For a subset of students ($n = 251$) exact test dates were available. The students with test dates available had eight months between the two tests – and improved their reading skills by eleven months.

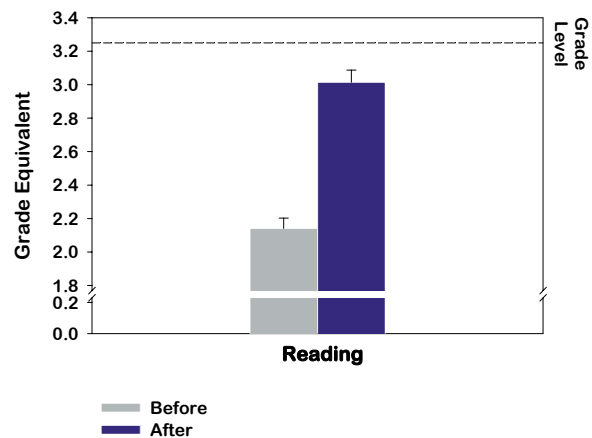


Figure 11. On average, students improved 10 months in reading performance after Fast ForWord product use. Results from 306 students are shown.

DISCUSSION

During the 2004 – 2005 school year, elementary school students in the Christina School District used the Fast ForWord products and participated in the study reported here. On average, students made significant gains in reading ability after Fast ForWord product use as measured by district and state tests as well as tests not linked to the district curriculum (STAR Reading and GMRT). These findings demonstrate that, within the Christina School District, an optimal learning environment coupled with a focus on cognitive and early reading skills can help students attain a higher level of reading achievement.

CONCLUSION

Language and reading skills are critical for all students, impacting their ability to benefit from instruction, follow directions and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. After Fast ForWord use, students in the Christina School District made significant gains in their reading skills. Students also improved their academic achievement: 51% of students with DSTP Reading scores available met Delaware performance standards after Fast ForWord product use (compared to 42% before) and 48% met Delaware Math performance standards (compared to 42% before). This suggests that using the Fast ForWord products strengthened the students' foundational skills and helped them benefit more from the classroom curriculum.

Notes:

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